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Fossil Mammals from the Lower Buck Hill Group, Eocene of Trans-Pecos Texas:

Marsupicarnivora, Primates, Taeniodonta, Condylarthra, Bunodont Artiodactyla, and Dinocerata

Robert M. West

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—Jane Sullivan, Editor

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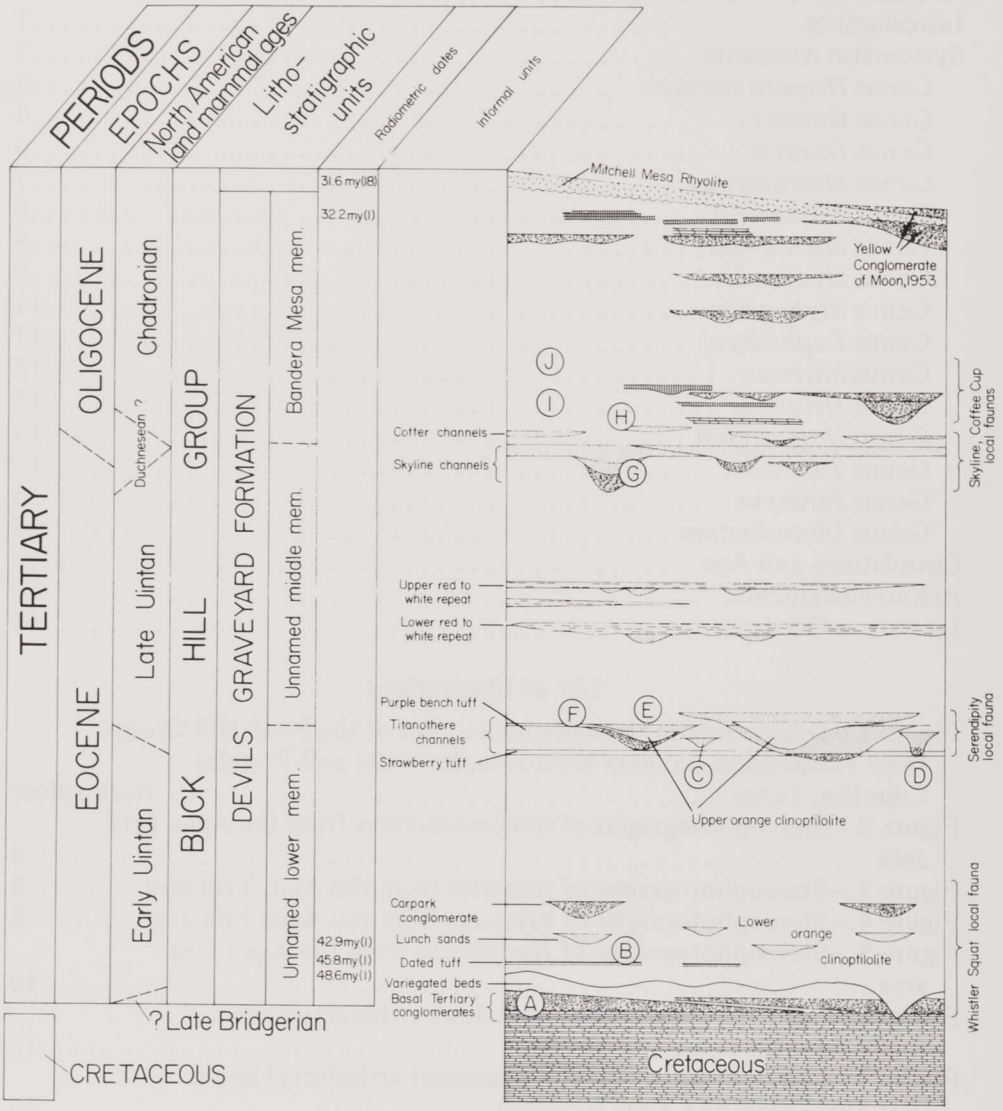

Figure 1.—Diagrammatic stratigraphic section of the Buck Hill Group, Devil's Graveyard-Bandera Mesa area, Brewster and Presidio Counties, Texas, to show approximate relative thickness and stratigraphic position of fossil localities, local faunas and North American land mammal ages. Devil's Graveyard Formation and Bandera Mesa Member are manuscript names reserved by the Geologic Names Committee, U.S. Geological Survey. Radiometric dates are from McDowell (1979) except 32.2 m.y. which is an unpublished date from Geochron Laboratories. The number in parentheses following the date signifies the number of samples. Letters refer to the stratigraphic position of one or more fossil localities. Fossil localities referred to in this paper are: A. 41443, Junction; 41444, .6 mi from Junction. B. 41372, Whistler Squat quarry; 41466, 300 yds southeast of quarry. C. 41745, Serendipity. F. 41672, Purple Bench. Stratigraphic section compiled by James B. and Margaret S. Stevens, Lamar University, Beaumont, Texas.

Fossil Mammals from the Lower Buck Hill Group, Eocene of Trans-Pecos Texas: Marsupicarnivora, Primates, Taeniodonta, Condylarthra, Bunodont Artiodactyla, and Dinocerata

by

Robert M. West*

Abstract

Two assemblages of fossil mammals from the lower part of the Eocene Buck Hill Group, Brewster County, Texas, contain two species of marsupials, five of primates, two of condylarths, one taeniodont, six of bunodont artiodactyls, and one uintathere. Most of these are specifically identical to organisms from the Bridgerian and Uintan faunas of the Rocky Mountain region of Utah and Wyoming. Relatively few are closely related to species of the same age from Southern California. One artiodactyl represents a new genus. The age of the stratigraphically lower assemblage, part of the Whistler Squat local fauna, is late Bridgerian or early Uintan, while that of the higher assemblage, from the Serendipity local fauna, is clearly Uintan.

INTRODUCTION

The lower part of the Buck Hill Group in the Agua Fria area of Brewster County, Texas, has yielded a large suite of vertebrate fossils from numerous localities. Wilson and Schiebout (1981) suggest the presence of three local faunas (Fig. 1). The oldest—the Whistler Squat local fauna—was collected from rocks underlying a micaceous tuff dated at 42.9 ± 0.9 myr and above a calcareous tuff dated at 45.8 ± 1.1 myr and 48.6 ± 1.3 myr (McDowell, 1979). The middle—the Serendipity local fauna—comes from rocks above the 42.9 ± 1.3 tuff. Thus, in terms of the radiometric ages presently applied to the North American land mammal sequence, the Whistler Squat local fauna is early Uintan in age and the Serendipity local fauna is late Uintan in age. On the other hand, the rodents of the Whistler Squat local fauna appear to be Bridgerian (Wood, 1973) while the presence of *Leptoreodon* and an amynodont may be confirmation of a Uintan age (Wilson, 1974). The Whistler Squat local fauna thus illustrates a discrepancy between radiochronology and biochronology.

The faunas from the lower Buck Hill Group, presently called the Pruett Formation—a name which will be abandoned by Stevens *et al.* (1975 [abstract] and in preparation)—are only partly published. Wood (1972; 1973) studied the rodents; Wilson (1974) the selenodont artiodactyls; Gustafson (1977) the carnivores and (1979) the insectivore *Simidectes*; and Wilson and Schiebout (1981) the amynodont perissodactyls. The present contribution discusses materials referred to five additional mammalian orders (Marsupicarnivora, Primates, Taeniodonta, Condylarthra, and Dinocerata) and the bunodont artiodactyls.

The geological setting of the Pruett Formation localities has not yet been described in detail. Brief summaries appear in Wood (1973), Wilson (1977), Gustafson (1979), and Wilson and Schiebout (1981). Detailed stratigraphic work has been done by J.B. Stevens and M.S. Stevens, and a full study of

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the stratigraphy of the lower Buck Hill Group in the Agua Fria area is in preparation by J.B. Stevens *et al.*

All the specimens discussed in this paper are in the collection of the Texas Memorial Museum and are referred to below without an identifying alphabetical prefix. The locality at which a specimen was collected is identified by the five-digit number preceding the hyphen in the full specimen number. Full locality data are on file at the Texas Memorial Museum.

Museum acronyms used below:

AMNH	American Museum of Natural History, New York
PU	Princeton University Museum of Natural History

Abbreviations used below:

mm	millimeters
myr	millions of years ago
L	maximum length
W	maximum width
Wa	anterior width
Wp	posterior width
N	number of specimens
$\bar{x}$	mean
s	standard deviation
v	coefficient of variation

SYSTEMATIC ACCOUNTS

Order Marsupicarnivora

Family Didelphidae

Herpetotherium Cope 1873

Figure 2a–d

Material: *H. marsupium:* 41443-295, $M^{1,2 or 3}$; 41443-302, $M^{1,2 or 3}$; 41443-309, $M^{1,2 or 3}$; 41443-429, M^4; 41443-189, $M_{1,2 or 3}$; 41443-211, $M_{1,2 or 3}$; 41443-218, $M_{1,2 or 3}$; 41443-459, $M_{1,2 or 3}$; 41443-467, $M_{1,2 or 3}$; 41443-528, $M_{1,2 or 3}$; 41443-581, $M_{1,2 or 3}$; 41444-67, $M_{1,2 or 3}$; 41444-130, $M_{1,2 or 3}$; 41372-239, $M_{1,2 or 3}$; 41372-403, $M_{1,2 or 3}$.

Herpetotherium cf. *H. comstocki.* 41443-565, $M^{1,2 or 3}$; 41443-460, $M_{1,2 or 3}$; 41444-165, $M_{1,2 or 3}$.

Discussion: Paleogene oppossums are among the smallest known fossil mammals and are seriously underrepresented in most collections. Intense screening of matrix at localities 41372, 41443 and 41444 has yielded 18 isolated didelphid teeth, apparently representing two species of *Herpetotherium.* Crochet (1977) has reviewed the Paleogene didelphids and has concluded that North American species belong to three genera. *Peratherium,* the genus to which most American didelphids have been referred in the past, is now regarded as exclusively European. Crochet resurrected *Herpetotherium* to accommodate most of the species previously assigned to *Peratherium* in North America and recognized by their well-developed dilambdodonty. Two

Figure 2.—Stereophotographs of *Herpetotherium* from the Agua Fria area. A. 41443-309, *H. marsupium,* $M^{1, 2 \text{ or } 3}$; B. 41443-459, *H. marsupium,* $M_{1, 2 \text{ or } 3}$; C. 41443-565, *H.* cf. *comstocki,* $M^{1, 2 \text{ or } 3}$; D. 41444-165, *H.* cf. *comstocki,* $M_{1, 2 \text{ or } 3}$. Scale units equal 1 mm.

other North American genera, *Peradectes* and *Nanodelphys,* are distinguished from *Herpetotherium* by both generally smaller size and less pronounced dilambdodonty.

The upper molars from the Pruett Formation are clearly dilambdodont, have deep middle clefts, doubled stylar cusps C, and large stylar cusps B and D (terminology follows definitions of Clemens, 1966). The lower molars show the typical didelphid conservative pattern with internally situated hypoconulids. As shown in Table 1, Pruett Formation *Herpetotherium* teeth represent two distinct size groups. The smaller falls readily into the size range of both *H. marsupium* and *H. knighti.* The development of stylar cusps B, C, and D suggests a more likely assignment to *H. marsupium* than to *H. knighti,* which lacks stylar cusp C (McGrew, 1959). The larger species, represented by only three teeth, is in the same size range as early Eocene *H. comstocki.* Upper and lower teeth of *H. comstocki* have yet to be found in association, so assignment of the upper and lower teeth to the same species is based entirely on relative size. The presence, however, of *Herpetotherium* cf. *H. comstocki* in the lower Pruett Formation (Whistler Squat local fauna) confirms the broad distribution of larger Eocene didelphids previously seen in Wyoming (McGrew, 1959; West, 1973) and Colorado (Simpson, 1968).

Various species of *Herpetotherium* have been reported from middle and late Eocene rocks of southern California, southern Colorado, northern Utah and Wyoming. However, the usually inadequate representation of didelphids in collections of Paleogene mammals, their generally fragmentary condition,

Table 1.—Measurements (in mm) of *Herpetotherium*

Herpetotherium marsupium

$M^{1, 2, or 3}$			M^4			$M_{1, 2, or 3}$			
Specimen	L	W	Specimen	L	W	Specimen	L	Wa	Wp
41443-295	2.2	–	41443-429	1.7	1.2	41443-218	2.6	1.2	1.4
41443-309	2.2	2.0				41372-403	2.6	1.4	1.4
41443-302	1.8	1.9				41372-239	1.7	1.0	1.0
41444-16	2.0	2.2				41443-189	1.9	1.0	1.2
						41444-67	2.4	1.3	1.2
						41443-211	2.0	1.0	1.0
						41443-528	2.1	1.0	1.2
						41443-354	2.6	1.4	1.4
						41443-467	2.0	0.9	1.0
						41444-130	2.3	1.3	1.3
						41443-459	2.2	1.0	1.1

Herpetotherium cf. *comstocki*

$M^{1, 2, or 3}$			$M_{1, 2, or 3}$			
Specimen	L	W	Specimen	L	Wa	Wp
41443-565	3.0	3.2	41443-460	3.0	1.4	1.6
			41444-165	3.2	1.8	1.8

and their extreme morphologic conservatism effectively eliminate didelphids as biostratigraphically useful taxa.

Order Primates
Family Omomyidae
Omomys Leidy, 1869
Omomys carteri Leidy, 1869
Fig. 3a–d

Material: 41443-359, P^4; 41443-584, P^4; 41444-154, M^1; 41444-57, $M^{1 or 2}$; 41443-136, $M^{1 or 2}$; 41443-314, M^2; 41443-356, M^2; 41443-358, M^2; 41443-431, M^2; 41443-292, $M^{1 or 2}$; 41443-530, $M^{1 or 2}$; 41443-196, M^3; 41443-227, M^3; 41443-444, dP_4; 41443-186, P_4; 41443-193, P_4; 41443-355, P_4; 41443-357, P_4; 41443-437, P_4; 41444-139, P_4; 41443-585, M_1; 41443-225, M_1; 41443-307, M_1; 41443-343, M_1; 41443-447, M_1; 41444-11, M_1; 41444-13, M_1; 41444-14, $M_{1 or 2}$; 41444-15, $M_{1 or 2}$; 41443-191, $M_{1 or 2}$; 41443-214, $M_{1 or 2}$; 41443-134, M_2; 41672-72, M_{2-3}; 41443-361, M_3; 41443-464, M_3; 41444-10, M_3.

Discussion: One morphologically variable species of small omomyid is referable to the common Bridgerian species *Omomys carteri.* There is no significant difference between the Pruett Formation *Omomys* and that known so well from the medial Eocene of Wyoming and northeastern Utah (Szalay, 1976). All but one of the Pruett Formation specimens come from localities 41443 and 41444 and are included in the Whistler Squat local fauna; the single specimen from 41672, a dentary fragment with M_2-M_3 (Fig. 3), is

Figure 3.—Stereophotographs of primates from the Agua Fria area. A. 41443-464, *Omomys carteri,* M_3; B. 41444-57, *Omomys carteri,* $M^{1 \text{ or } 2}$; C. 41672-72, *Omomys carteri,* M_2-M_3; D. 41443-358, *Omomys carteri,* M^2; E. 31281-30, *Macrotarsius* sp., P^4-m^1. Scale units equal 1 mm.

Table 2.—Measurements (in mm) of *Omomys carteri*

Tooth	Dimension	N	$\bar{x}$	s	cv
P_4	L	6	2.28	.13	2.22
	W	6	1.57	.27	4.43
M_1	L	7	2.56	.08	1.12
	Wa	7	1.63	.19	2.70
	Wp	7	1.81	.13	1.92
M_2	L	4	2.68	.10	2.39
	Wa	4	2.10	.16	4.08
	Wp	4	2.25	.10	2.50
M_3	L	3	3.00	.20	6.67
	Wa	4	1.80	.16	4.08
	Wp	3	1.80	.30	10.00
p^4	L	2	2.05		
	W	2	2.95		
M^1	L	1	2.40		
	W	1	3.40		
M^2	L	1	2.80		
	W	1	4.10		
M^3	L	2	1.80		
	W	2	2.75		

larger and more bulbous than those from the lower beds and belongs to the Serendipity local fauna. Even with the large 41672-72 included, the standard deviations and coefficients of variation seem reasonable (Table 2).

Omomys carteri is best known from throughout the Bridger Formation of southwestern Wyoming and the nearby Powder Wash locality in the Green River Formation of northeastern Utah. Lillegraven (1980) recently reported it from the Lutetian of the San Diego area of southern California.

Ourayia Gazin, 1958

This poorly known genus has been revised twice recently, with substantially different results. Szalay (1976) included seven specimens in the genus and synonymized *Hemiacodon jepseni* (Robinson, 1968) and *Mytonius hopsoni* (Robinson, 1968) with *Ourayia.* Krishtalka (1978) retained *Mytonius* as a separate omomyid, and placed the only specimen with associated upper and lower dentitions (PU 16431) in *Macrotarsius.* The ensuing discussion of *Ourayia* and *Macrotarsius* follows Krishtalka's systematics.

Ourayia uintensis (Osborn) 1895

Material: 41443-29, M_1.

Discussion: This specimen compares well with PU 11236 and AM 1899, both of which are regarded as *Ourayia* by Szalay (1976) and Krishtalka (1978). It is distinguished from the first lower molar of *Macrotarsius* by its great posterior width, contact of the cristid obliqua with the posterior flank of the protoconid, straight buccal margin, and absence of a vertical post behind the metaconid. The specimen is 4.0 mm long, 2.8 mm wide anteriorly, and 3.0 mm wide posteriorly.

Ourayia uintensis, as restricted by Krishtalka, is known only from the early Uintan of northeastern Utah. This specimen plus those referred below to *Macrotarsius* extend this complex southward to Texas.

Table 3.—Measurements (in mm) of *Macrotarsius* sp.

Specimen	p^4		M^1			M^2		
	L	W	L	W	Wp	L	Wa	Wp
41443-137	2.9	3.6						
31281-30	2.8	4.0	4.0	4.3	4.8	3.6	5.3	4.8

Macrotarsius Clark, 1941

Krishtalka (1978) followed Szalay (1976), Robinson (1968), Simons (1961) and Gazin (1958) in noting a very close relationship between *Macrotarsius* and *Ourayia*. The morphologic differences between the two genera are modest. The eventual accumulation of statistically significant samples will help to clarify the question of the validity of both genera. The absence of upper teeth of *Ourayia* (*sensu* Krishtalka) further hinders comparisons.

Macrotarsius sp.
Fig. 3e

Material: 31281-30, partial right maxilla; 41443-137, P^4.

Discussion: The palate compares well with the maxillary dentition (PU 16431) illustrated by Szalay, who regarded it as *Ourayia uintensis*. Breakage of the external parts of the teeth of 31281-30 precludes definitive measurements, but the specimen clearly is very close in size to PU 16431, and it also has the characteristically crenulated enamel of *Macrotarsius*.

The fourth upper premolar has two major cusps; the paracone is broken off on 31281-30, but 41443-137 is a complete P^4. There is a very slight development of a posterior style. The external cingulum is strong and the anterior cingulum is continuous from the antero-external corner of the tooth to the leading edge of the protocone. A low paraconule ridge extends labially from the protocone, but does not join the anterior cingulum. The inner part of the tooth is somewhat squared as a result of the pronounced angle of the postero-internal cingulum.

The first and second molars are represented only by the protocone region and allied parts of the prominent anterior and posterior cingula and modestly expanded hypocone. The pericones of 31281-30 are not as strong as on PU 16431, but they do contribute to the square internal outline of the teeth.

Macrotarsius species are differentiated by the degree of compaction of the antemolar teeth and the nature of any connection between the mesostyle and the ectoloph. The Pruett Formation specimens do not preserve the critical features, so it is not possible to assign them to a species. The size of the specimens (Table 3) suggests reference to either *M. siegerti* or *M. jepseni*.

Number 31281-30 was collected at a locality not associated with the Agua Fria sequence. That locality is in the Colmena Formation of the Vieja area, about 65 km west of the Agua Fria area. Wilson (1977) included the specimen in the Candelaria local fauna as "Omomyid, gen. et sp. indet.", and regarded the Candelaria local fauna as late Uintan in age. He now (personal communication, April 1980) tentatively correlates the Candelaria local fauna with the Serendipity local fauna of the Agua Fria area.

The genus is widely distributed although uncommon in North America, as it has been found in Uintan rocks of the Wind River and Uinta Basins; the genoholotype (*M. montanus*) is from the Chadronian of southern Montana.

Figure 4.—Stereophotographs of primates from the Agua Fria area. A. 41444-18, *Notharctus tenebrosus,* M_3; B. 41466-7, *Microsyops annectens,* P^4-M^3. Scale units equal 1 mm.

It has recently been reported (Lillegraven, 1980), with a queried specific assignment to *M. jepseni,* from the Friars and Mission Valley Formations, early Uintan of southern California.

Family Notharctidae
Notharctus Leidy, 1870
Notharctus tenebrosus Leidy, 1870
Fig. 4a

Material: 41444-18, M_3.

Discussion: This specimen has the flexed cristid obliqua characteristic of *Notharctus* accompanied by a reduced paraconid and crenulated enamel. The heel is missing, preventing definitive measurements; however, the talonid and trigonid widths are well within the range of *N. tenebrosus,* the smaller of the two common Bridgerian species (Gingerich, 1979).

Notharctus tenebrosus was not known previously from outside the Green River Basin (Robinson, 1957; Gingerich,1970), although the larger *N. robustior* has been found in the lower part of the Washakie Formation (Robinson, 1957; Turnbull, 1972). A closely related form, *Smilodectes gracilis,* comes from Powder Wash, Utah, as well as from the Bridger Formation.

Family Microsyopidae
Microsyops Leidy, 1872
Microsyops annectens (Marsh) 1872
Fig. 4b

Material: 41372-308, M_2; 41443-212, P_4; 41443-650, M_1; 41466-7, P^4-M^3; 41444-24, M^{1-2}.

Discussion: In size (Table 4), upper cheek tooth morphology, and molar bunodonty, 41466-7 fits readily into *Microsyops annectens* as described and

Table 4.—Measurements (in mm) of *Microsyops* cf. *annectens*

Specimen	Tooth	L	Wa	Wp
41443-212	P_4	5.0	2.9	3.4
41443-650	M_1	4.2	2.8	3.2
41444-24	$M^{1 \text{ or } 2}$	5.4	5.6	
47466-7	P^4	5.2	5.4	
	M^2	5.4	5.4	
	M^3	5.2	4.8	

illustrated by Szalay (1969: 271–272). This specimen clearly is not *Craseops*—the only taxon with which it might be confused—because of the relatively small hypocone and small, non-protuberant mesostyle. The isolated lower teeth have the elongate paraconid and close proximity of the entoconid and hypoconulid that characterize *Microsyops*.

Microsyops annectens is known from the upper part of the Bridger Formation of southwestern Wyoming (Gazin, 1976) and the Aycross Formation at the summit of Togwotee Pass, west-central Wyoming (McKenna, 1972); a single fragmentary M^2 from the Mission Valley Formation of southern California (Lillegraven, 1980) extends its range to the early Uintan of the West Coast.

Order Condylarthra
Family Hyopsodontidae
Hyopsodus Leidy, 1870

The moderate-sized condylarth *Hyopsodus*, abundant in early and middle Eocene rocks of western North America, is rare in late Eocene assemblages. Several recent studies (Gazin, 1968; Gingerich, 1974; West, 1979a, 1979b; Krishtalka, 1979) have pointed out the substantial morphologic variability in Wasatchian *Hyopsodus*, followed by greater stability in the Bridgerian and Uintan. Due to the morphologic conservatism of the genus, sympatric species are differentiated almost exclusively on the basis of size. Subjective characters such as degree of lophodonty and molarization of the premolars permit biochronologic use of *Hyopsodus* only at the level of land-mammal age.

Krishtalka (1979), in his review of Uintan and Duchesnean *Hyopsodus* from the northern Rockies, advocated synonymy of *H. uintensis* and *H. fastigatus* and described a new, large species, *H. sholemi*. *Hyopsodus paulus*, the most common Bridgerian species (West, 1979a, 1979b) was shown to extend into the early Uintan (Uinta B at White River Pocket, Utah). The younger Uintan and Duchesnean species *H. uintensis* and *H. sholemi* are distinguished from it by their more molariform premolars, lophodont molars, large hypocones, and deep hypocone-protocone valleys on M^1 and M^2, and obliquely oriented trigonids on all three lower molars.

Only two localities (41443 and 41444) have more than single specimens of *Hyopsodus*, so *Hyopsodus* is relatively common in the Whistler Squat local fauna but rare in the Serendipity local fauna.

Comparisons of Pruett Formation *Hyopsodus* with the much more abundant materials from the northern Rockies leads to the conclusion that both *H. paulus* and a species identical or close to *H. uintensis* are present.

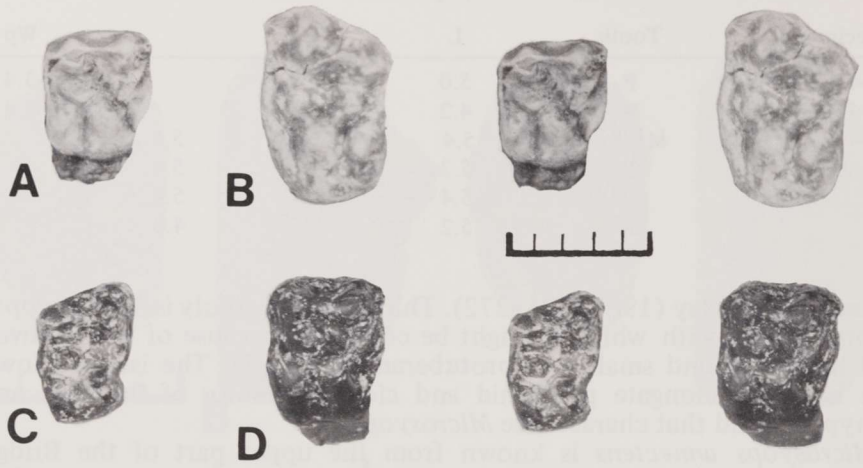

Figure 5.—Stereophotographs of *Hyopsodus* from the Agua Fria area. A. 41672-63, *H.* cf. *uintensis,* M^1; B. 41745-15, *H. uintensis,* M^2; C. 41372-227, *H.* cf. *uintensis,* M^2; D. 41443-28, *H. paulus,* M^2. Scale units equal 1 mm.

Hyopsodus paulus Leidy, 1870
Fig. 5

Material: 41672-170, P_4-M_1; 42287-10, P_3-M_1; 41443-24, dP_4; 41443-339, P_4; 41443-483, P_4; 41443-468, P_4; 41443-224, P_4; 41443-80, $M_{1\ or\ 2}$; 41443-217, $M_{1\ or\ 2}$; 41443-472, $M_{1\ or\ 2}$; 41443-622, $M_{1\ or\ 2}$; 41443-643, $M_{1\ or\ 2}$; 41443-624, M_1-M_2; 41372-471, M_3; 41443-4, M_3; 41443-81, M_3; 41443-439, M_3; 41443-580, M_3; 41443-614, M_3; 41443-346, P^4; 41443-515, P^4; 41444-150, P^4; 41443-28, M^1; 41443-430, M^1; 41443-422, $M^{1\ or\ 2}$; 41443-317, M^2; 41443-538, M^2; 41444-71, M^2; 41443-48, M^3.

Discussion: The size range (Table 5) of the most common Pruett Formation *Hyopsodus* falls readily into the small end of the range of *H. paulus* from the late Bridgerian of the southern Green River Basin, Wyoming (West, 1979a), and overlaps part of the large end of the size range of *H. lepidus.* Morphologically, the Pruett Formation specimens of *H. paulus* lack a P^4 paraconule, have a strong labial connection between the protocone and hypocone of the first two upper molars, and show complete separation of the entoconid and hypoconulid on the lower molars; these attributes typify *H. paulus.*

Hyopsodus uintensis Osborn, 1902
Fig. 5

Material: 41672-63, M^1; 41372-227, M^2; 41745-15, M^2; 40145-12, $M_{1\ or\ 2}$.

Discussion: Specimens from both the Whistler Squat local fauna and the Serendipity local fauna are referred to *H. uintensis,* although with varying degrees of certainty. The three upper molars have the *H. uintensis* characteristic of a deep valley between the hypocone and protocone, while the

Table 5.—Average measurements (in mm) of *Hyopsodus paulus*

P^4	M^1	M^2	M^3	P_4	M_1	M_2	M_3	$M_{1 \text{ or } 2}$
L 2.9	L 3.7	L 3.8	L 3.5	L 3.3	L 3.9	L 4.2	L 4.7	L 3.7
	Wa 4.4	Wa 5.0			Wa 2.9	Wa 3.4		Wa 4.4
W 4.1	Wp 4.2	Wp 4.7	W 4.6	W 2.5	Wp 3.2	Wp 3.4	W 3.1	Wp 4.2
N 3	N 1	N 1	N 2	N 5	N 3	N 1	N 5	N 1

Table 6.—Measurements (in mm) of *Hyopsodus uintensis*

41672-63 M^1	41745-15 M^2	41372-227 M^2	41477-12 $M_{1 \text{ or } 2}$
L 3.8	L 4.4	L 3.2	L 3.3
Wa 4.5	Wa 6.6	Wa 4.6	Wa 2.7
Wp 4.1	Wp 5.4	Wp 4.2	Wp 2.6

single lower molar has a nearly joined hypoconulid and entoconid. Number 41745-15 falls into the size range of known *H. uintensis* (Table 6), but the other three specimens are considerably smaller than are the more northerly specimens measured by Krishtalka. The small sample precludes any understanding of the range of variation, so these smaller individuals are best left as *Hyopsodus* cf. *H. uintensis*.

Order Taeniodonta
Family Stylinodontidae
Stylinodon Marsh, 1874
Stylinodon sp.

Material: 41443-291 and 41444-3, tooth fragments.

Discussion: These two tooth fragments consist of dentine pegs with the small enamel bands typical of taeniodonts. Specific identification is not possible.

Order Artiodactyla
Family Dichobunidae

At least five genera of bunodont artiodactyls occur in the Pruett Formation, although none is abundant. When added to the six selenodont species (Wilson, personal communication, November 1979), a considerable artiodactyl diversity is indicated. Neither of the other areas with faunas of comparable age has such diversity of both bunodont and selenodont taxa.

Lophiohyus Sinclair, 1914
Lophiohyus sp.
Fig. 6a

Material: 41466-12, $M_{1 \text{ or } 2}$.

Discussion: The isolated lower first or second molar referable to *Lophiohyus* is a large tooth (length: 12.3 mm; trigonid width: 8.6 mm; talonid width: 8.2 mm) that is severely weathered. A circular paraconid is present, as are an anterior, exterior, and posterior cingulum. The hypoconulid is

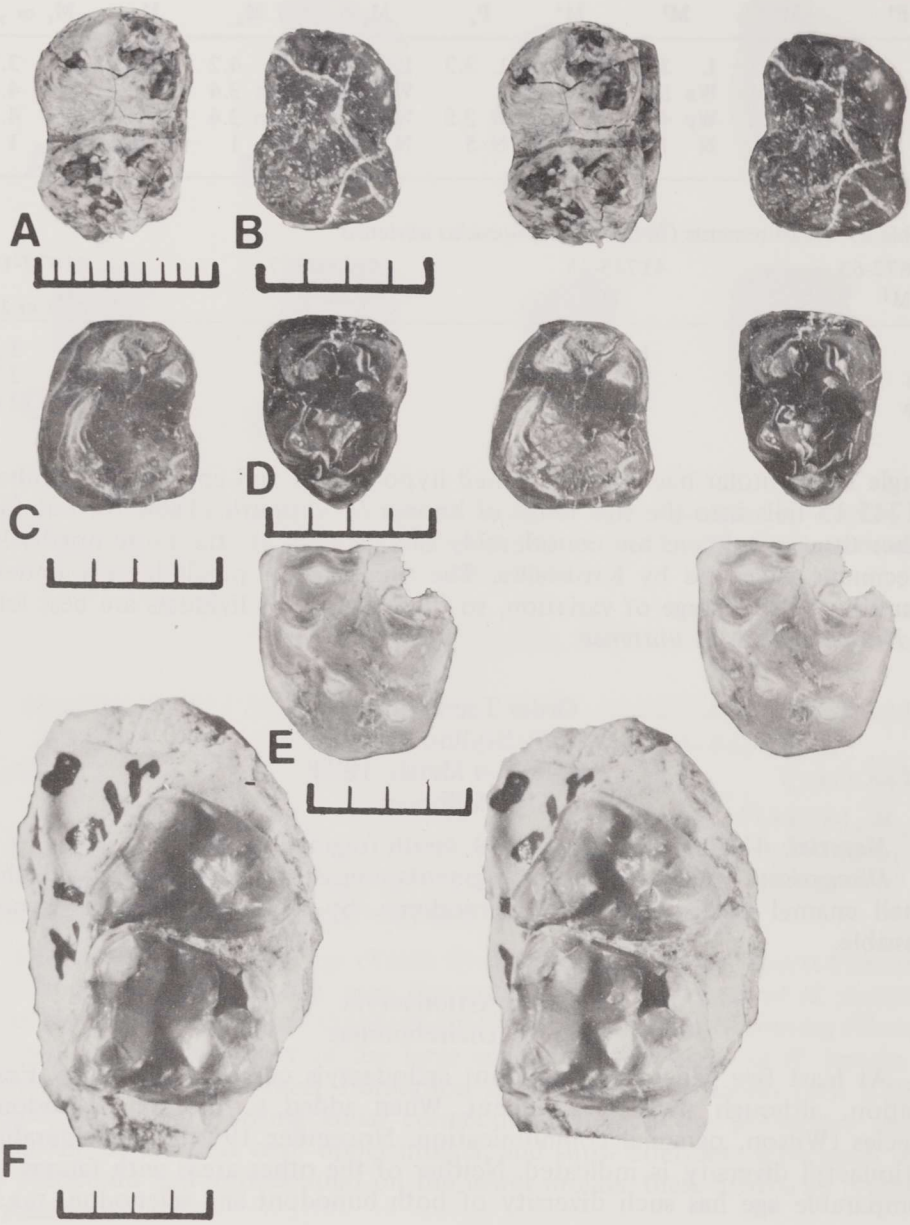

Figure 6.—Stereophotographs of bunodont artiodactyls from the Agua Fria area. A. 41466-12, *Lophiohyus* sp., $M_{1\ or\ 2}$; B. 41372-245, *Microsus* cf. *cuspidatus*, $M_{1\ or\ 2}$; C. 41443-470, *Helohyus* sp., $M_{1\ or\ 2}$; D. 41443-531, *Homacodon* cf. *H. vagans*, M_3; E. 41745-1, *Texodon meridianus*, dP^4; F. 41672-62, *Texodon meridianus* (holotype), M^2–M^3. Scale units equal 1mm.

broken away but appears to have been prominent. Number 41466-12 differs from Bridgerian *L. alticeps* in being slightly larger and having a relatively narrower talonid. *Lophiohyus* was previously known only from the Bridger Formation of Wyoming (Gazin, 1976).

Microsus Leidy, 1870
Microsus cf. *M. cuspidatus* Leidy, 1870
Fig. 6b

Material: 41372-245, $M_{1 or 2}$.

Discussion: *Microsus* is represented by an isolated lower first or second molar. Number 41372-245 is 4.7 mm long, 3.0 mm wide across the trigonid, and 3.4 mm wide across the talonid. It lacks a paraconid, has a relatively high trigonid and a rather internally situated hypoconulid. The Pruett Formation specimen is somewhat larger than *M. cuspidatus* from the Bridger Formation (Sinclair, 1914) but corresponds well morphologically.

Helohyus Marsh, 1872
Helohyus sp.
Fig. 6c

Material: 41443-470, $M_{1 or 2}$.

Discussion: This isolated lower first or second molar seems best referred to *Helohyus,* although it is approximately half the size of the corresponding teeth of the smallest Bridger Formation species, *H. plicodon* (Sinclair, 1914). It retains a conical paraconid and has a broad talonid with a poorly expressed hypoconulid. The tooth is 4.6 mm long, 3.4 mm in anterior width, and 3.8 mm in posterior width. *Helohyus* is otherwise known only from the Bridger Formation.

Homacodon Marsh, 1872
Homacodon cf. *H. vagans* Marsh, 1872
Fig. 6d

Material: 41443-531, M_3.

Discussion: This tooth, which is 4.9 mm long, 3.8 mm wide across the trigonid and 3.3 mm wide across the talonid, is somewhat smaller than Bridger Formation *H. vagans.* It lacks a paraconid and has very bulbous cusps that restrict the size of the talonid basin. The entoconid is markedly linear, with two cuspules. Anterior and internal cingula are well developed. *Homacodon* has been reported from the lower part of the Washakie Formation (Turnbull, 1972) as well as from the Bridger Formation (Gazin, 1976).

Texodon new genus

Included species: *Texodon meridianus,* type species only.
Horizon: Lower Pruett Formation, middle or late Eocene.
Distribution: Agua Fria region, Brewster County, Texas.
Etymology: "Texas" plus "odon," Greek for tooth.
Diagnosis: As for the single known species.

Texodon meridianus new species
Fig. 6e,f

Holotype: 41672-62, left M^2-M^3, Purple Bench locality, Agua Fria area, Brewster County, Texas.

Hypodigm: Holotype plus 41745-1, left dP^4.

Distribution: Agua Fria region, Brewster County, Texas.

Etymology: Latin *meridianus,* "southern", for the geographic area of discovery.

Definition: Moderate-sized bunodont artiodactyl with strong M^2 hypocone, hypocone lacking on M^3, M^2 paraconule and metaconule small but equal in size, M^3 smaller than M^2, minor parastyle but no meso- or metastyle, and strong cingula.

Description: M^2 is 5.0 mm long, 5.6 mm wide anteriorly, and 5.0 mm wide posteriorly. The paracone and metacone are equal in size and separated by a broad valley. Anteriorly the paracone crest extends into a parastyle, damaged on this specimen. This parastyle is continuous with both anterior and external cingula, and is joined by a prominent preparacrista from the paraconule. A very low postparacrista joins the base of the internal face of the paracone. The metaconule, equal in size to the paraconule, has both pre- and postmetacristae, but neither merges into any other structure. The paraconule is firmly joined with the antero-external corner of the large protocone which in turn is weakly joined with the metaconule, enclosing a central valley. The well-developed hypocone is approximately equal in size to the conules; it is part of the posterior cingulum and is not joined to any other structure.

The third molar, 4.2 mm long and 5.6 mm wide, is markedly smaller than M^2. Its paracone is larger than the metacone. As in M^2, a well-developed parastyle is weakly joined with the paracone. The pre- and postparacristae are developed as in M^2, and the paraconule is firmly connected with the protocone. The metaconule is smaller than the paraconule, and its postmetacrista extends to the postero-external corner of the tooth where it is continuous with the external cingulum. There is no hypocone, accounting for the triangular shape of the tooth, although there is a modest expansion of the posterior cingulum between the protocone and metaconule.

The deciduous upper premolar 41672-62 is 5.2 mm long, 5.4 mm wide anteriorly, and 5.2 mm wide posteriorly. The pattern of cingula, cones, conules, and crests closely resembles that of M^2. The tooth is lower crowned and, on the basis of wear pattern, has weaker and/or thinner enamel than does M^2.

Discussion: *Texodon* seems most closely related to *Homacodon,* with which it shares the following characters: hypocone on M^2 and not on M^3; strong cingula; M^2 conules of equal size; minor parastyle but no mesostyle. It differs from *Homacodon* in the small size of M_3, absence of any metastyle development, and relatively small size of the conules.

The dichobunid artiodactyls, expecially those of Bridgerian and Uintan age, are inadequately known. The last comprehensive study was by Sinclair (1914); subsequent field work has produced much material that was unavailable to Sinclair and must be studied before dichobunid systematics can be understood. The recognition here of *Texodon meridianus* reveals yet another aspect of dichobunid diversity.

Figure 7.—Stereophotographs of a bunodont artiodactyl and a uintathere from the Agua Fria area. A. 42287-15, *Parahyus vagus,* P_3; B. 42287-9, cf. *Uintatherium anceps,* M^2. Scale units equal 10 mm.

Parahyus Marsh 1876
Parahyus vagus Marsh 1876
Figure 7a

Material: 42287-15, right P_3

Discussion: *Parahyus* is an enigmatic genus of large bunodont artiodactyl, known from only two other reported specimens (Peterson, 1919; Gazin, 1955; Lewis, 1973). The holotype (Marsh, 1876) is accompanied by ambiguous data, while Lewis's referred specimen clearly comes from the Uintan Tepee Trail Formation of central Wyoming. Work subsequent to Lewis's paper has confirmed the age of the Tepee Trail Formation in the area of *Parahyus* occurrence, and the grade of morphologic development of *Parahyus* is quite compatible with that age assignment.

The Texas specimen conforms well with P_3 in both published mandibles and, at 19.4 mm long by 10.2 mm wide, is intermediate in size between *Helohyus lentus* and *Achaenodon.*

Order Dinocerata
Family Uintatheriidae
cf. *Uintatherium anceps* (Marsh 1871)
Figure 7b

Material: 42287-9, M^2 fragment

Discussion: This specimen, though lacking part of the labial border and the lingual half of the tooth, is clearly a uintathere. It has the typical high paracone, deep labial cleft between the paracone and metacone, prominent lingually converging lophs, and well-developed anterior and posterior cingula. Its length (26.5 mm) and general proportions compare favorably to those

Table 7.—Distribution of taxa discussed in this paper. Localities arranged from oldest on left. Numbers indicate total number of specimens referred to each taxon.

	41672	44287	41444	41443	41372	41466	41745	41762	31281
Didelphidae									
Herpetotherium marsupium			3	12	2				
Herpetotherium cf. *comstocki*			1	2					
Omomyidae									
Omomys carteri			9	29				1	
Ourayia uintensis				1					1
Macrotarsius sp.				1					
Adapidae									
Notharctus tenebrosus			1						
Microsyopidae									
Microsyops annectens			1	2		1			
Hyopsodontidae									
Hyopsodus paulus	1	1	3	19					
Hyopsodus uintensis					1	1	1	1	
Stylinodontidae									
Stylinodon sp.			1	1					
Dichobunidae									
Lophiohyus alticeps						1			
Microsus cf.*cuspidatus*					1				
Helohyus sp.				1					
Homacodon cf. *vagans*				1					
Texodon meridianus							1	1	
Parahyus vagus	1								
Indet. artiodactyls			1		2				
Uintatheriidae									
cf. *Uintatherium anceps*	1								

of *Uintatherium anceps* from the upper part of the Bridger Formation (Wheeler, 1961). The generic assignment is queried because there is size overlap between *Uintatherium* and the larger *Tetheopsis* and *Eobasileus,* which are distinguished by nondental cranial features.

Uintatheres were previously known in North America only from the Paleocene and Eocene of the Rocky Mountain area (Wheeler, 1961) and the Uintan late Eocene of southern California (Hutchison, 1971). This occurrence, therefore, is a major range extension for the Dinocerata.

CORRELATIONS AND AGE

Comparisons between the marsupials, primates, taeniodonts, condylarths, bunodont artiodactyls and uintatheres of the two Pruett Formation local faunas and those from various Bridgerian and Uintan assemblages from both the Rockies and the West Coast are given in Tables 7 and 8. The Pruett

Table 8.—Distribution of Pruett Formation taxa. G = genus present; S = species present.

	Whistler Squat		Serendipity		Upper Wasatch		Lower Bridger		Upper Bridger		Lower Uinta		Upper Uinta		Friars-Mission Valley	
	G	S	G	S	G	S	G	S	G	S	G	S	G	S	G	S
Herpetotherium marsupium	X	X					X	X	X	X						
Herpetotherium comstocki	X	X			X	X										
Omomys carteri	X	X	X	X			X	X	X	X	X				X	X
Ourayia uintensis	X	X									X	X				
Macrotarsius sp.	X												X		X	
Notharctus tenebrosus	X	X					X	X	X						X	
Microsyops annectens	X	X					X		X	X					X	X
Hyopsodus paulus	X	X	X		X		X	X	X	X	X	X				
Hyopsodus uintensis	X	X	X	X	X		X		X		X	X				
Stylinodon sp.	X								X		X					
Lophiohyus alticeps	X	X							X	X						
Microsus sp.	X						X		X							
Helohyus sp.	X						X		X							
Homacodon cf. *vagus*	X	X							X	X						
Texodon meridianus			X	X												
Parahyus vagus	X	X									X	X				
cf. *Uintatherium anceps*	X	X							X	X					?	X

Formation assemblages share more taxa with the various areas of the Utah and Wyoming Rockies than they do with Southern California. Golz and Lillegraven (1977) and Lillegraven (1979, 1980) recently reviewed the late Eocene faunas of southern California and pointed out the increase in endemism in that region through the late Eocene. The persistence of certain taxa (e.g., *Pelycodus* near *P. ralstoni*) into the Lutetian is regarded as evidence that southern California may have served as a refugium for taxa which had long since been eliminated farther north.

The age of the Whistler Squat local fauna was considered to be Bridgerian by Wood (1973) and early Uintan by Wilson (1974). Its radiometric age (at a maximum, 48.6 ± 1.3 my and at a minimum, 42.9 ± 0.9 my) includes the Bridgerian-Uintan boundary as currently drawn (Berggren *et al.*, 1978). The taxa analyzed here generally have a Bridgerian range to the north. However, *Ourayia* and *Parahyus* occur in the early Uintan, and *Hyopsodus uintensis* and *Macrotarsius* are late Uintan forms (with *Macrotarsius* persisting into the Chadronian in Montana).

Because of its superposition, the Serendipity local fauna clearly is younger than the Whistler Squat local fauna. Of the three taxa from the Whistler Squat local fauna studied here, *Omomys carteri* is known from the Bridgerian of Wyoming and Utah and also from the early Uintan Friars and Mission Valley Formations of California (Lillegraven, 1980). *Hyopsodus uintensis* is otherwise recorded only in the late Uintan (Myton level) of Utah, and *Texodon meridianus* is a new taxon, apparently endemic to Texas. The Serendipity local fauna is probably younger than 42.9 ± 0.9 my, so a Uintan age is reasonable.

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